

CLAIMS

What is Claimed is:

1. An isolated polynucleotide comprising a nucleotide sequence encoding a mammalian KChAP protein or a nucleotide sequence complementary to a nucleotide sequence encoding a mammalian KChAP protein.
2. The polynucleotide of claim 1 wherein said sequence encodes a protein selected from the group consisting of human KChAP protein and rat KChAP protein.
3. The polynucleotide of claim 1 wherein said nucleotide sequence encodes an amino acid sequence having at least 85% identity to a member selected from the group consisting of:
 - (a) the amino acid sequence set forth in Fig. 2, SEQ ID NO: 2;
 - (b) the amino acid sequence set forth in Fig. 3, SEQ ID NO: 4; and
 - (c) the amino acid sequence set forth in SEQ ID NO: 6.
4. The polynucleotide of claim 1 wherein said nucleotide sequence encodes an amino acid sequence having at least 95% identity to a member selected from the group consisting of:
 - (a) the amino acid sequence set forth in Fig. 2, SEQ ID NO: 2;
 - (b) the amino acid sequence set forth in Fig. 3, SEQ ID NO: 4; and
 - (c) the amino acid sequence set forth in SEQ ID NO: 6.
5. The polynucleotide of claim 1 wherein the nucleotide sequence encodes a polypeptide comprising the amino acid sequence, SEQ ID NO: 2, shown in Fig. 2 or an allelic variant thereof.
6. The polynucleotide of claim 1 wherein the nucleotide sequence encodes a polypeptide comprising the amino acid sequence, SEQ ID NO: 4, shown in Fig. 3 or an allelic variant thereof.
7. The polynucleotide of claim 1 wherein said polynucleotide comprises a nucleotide sequence selected from the group consisting of:
 - a) a sequence having at least 85% identity to the nucleotide sequence set forth in SEQ ID NO:1;

- b) a sequence complementary to the nucleotide sequence set forth in SEQ ID NO: 1;
 - c) a sequence having at least 85% identity to the nucleotide sequence set forth in SEQ ID NO:3; and
 - d) a sequence complementary to the nucleotide sequence set forth in SEQ ID NO: 1
- 5 SEQ ID NO: 3.

8. The polynucleotide of claim 1 wherein said protein binds to the N-termini of the Kv α subunits Kv2.1, Kv2.2, Kv1.3, and Kv4.3 and to the C-terminus of Kv β 1.2 and wherein said protein comprises: a Kv α /Kv β binding domain having the amino acid sequence set forth in SEQ ID NO: 10.

9. The polynucleotide of claim 8 wherein said protein further comprises a C terminal domain having the amino acid sequence set forth in SEQ ID NO: 11.

10. An isolated polynucleotide comprising a sequence encoding a peptide fragment of a KChAP protein, said peptide fragment selected from the group consisting of the Kv α /Kv β binding domain of the KChAP protein, the C-terminal region of the KChAP protein, and combinations thereof.

11. The polynucleotide of claim 10, wherein said polynucleotide encodes a peptide comprising an amino acid sequence having at least 85% identity with an amino acid sequence selected from the group consisting of the amino acid sequence of SEQ ID NO: 5, the amino acid sequence of SEQ ID NO: 7, the amino acid sequence of SEQ ID NO: 10, the amino acid sequence of SEQ ID NO: 11, and combinations thereof.

12. An isolated KChAP protein.

13. The isolated protein of claim 12 wherein said protein comprises an amino acid sequence having at least 85% identity with the amino acid sequence shown in Fig. 2, SEQ ID NO: 2 or the amino acid sequence shown in Fig. 3, SEQ ID NO: 4, or the amino acid sequence set forth in SEQ ID NO: 6.

14. The isolated protein of claim 12 wherein said protein comprises an amino acid sequence having at least 95% identity with the amino acid sequence shown in Fig. 2, SEQ ID NO: 2 or the amino acid sequence shown in Fig. 3, SEQ ID NO: 4, or the amino acid sequence set forth in SEQ ID NO: 6.

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15. An isolated peptide comprising the Kv α /Kv β binding domain of KChAP.

16. The isolated peptide of claim 15 wherein said peptide comprises an amino acid sequence having at least 85% identity with the amino acid sequence selected from the group consisting of the amino acid sequence of SEQ ID NO: 5, the amino acid sequence of SEQ ID NO: 7, and the amino acid sequence of SEQ ID NO: 10.

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17. A host cell comprising a polynucleotide encoding a KChAP protein and a polynucleotide encoding an exogenous Kv α subunit.

18. The host cell of claim 17 wherein the Kv α subunit is selected from the group consisting of Kv2.1, Kv2.2, Kv1.3 and Kv4.3.

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19. A method for increasing the number of Kv channels formed by a Kv α subunit on the plasma membrane of a host cell, comprising the steps of:

(a) providing a cRNA molecule comprising a nucleotide sequence encoding KChAP;

(b) providing a cRNA molecule comprising a nucleotide sequence encoding said Kv α subunit;

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wherein the nucleotide sequence encoding KChAP and the nucleotide sequence encoding said Kv α subunit may be on the same or different cRNA molecules; and

(c) introducing the cRNA molecule encoding KChAP and the cRNA encoding said Kv α subunit into the host cell.

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20. A method for testing the effect of a compound on current flow through a Kv channel formed by a plurality of Kv α subunits, said method comprising the following steps:

- a. providing a control population of cells that lack Kv channels formed by said Kv α subunit;
- b. providing a test population of cells having a plurality of Kv channels formed by said Kv α subunits, said test population comprising host cells co-injected with cRNA molecules encoding KChAP and with cRNA molecules encoding said Kv α subunit;
- c. treating the test population and the control population with the compound; and
- d. measuring whole-cell currents in said test population and said control population; wherein a difference between the whole-cell currents in said test population and said control populations is indicative of an effect of the compound on current flow through the Kv channels formed by the Kv α subunits.